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Weighing the snow core to determine the water content

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FEDERAL-STATE COOPERATIVE SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

RIO GRANDE DRAINAGE BASIN

MARCH 1, 1945

By

Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado and New Mexico and other Federal, State and local organizations.

MARCH 1, 1945

WATER SUPPLY OUTLOOK

RIO GRANDE

Prospects for a favorable run-off in the Rio Grande, 1945 are quite promising at this time. Snow on the headwaters is practically normal but the high drainage area soils are dry. For the Chama the outlook is fairly good. The Canadian is about normal and the Pecos has slightly above normal snow cover. Reservoir storage is better than it was a year ago.

RIO GRANDE AND TRIBUTARIES

RIO GRANDE: On the headwaters of the Rio Grande, in Colorado, the present average water content of the snow cover is 10 inches and on March 1 last year it was 10½. The 10-year average is 10½. For the tributary streams in northern New Mexico the conditions are comparable. The average snow-water storage over the entire drainage, for the main river and its tributaries in these areas, is the same as it was a year ago and just slightly more than normal . The February accumulation of water was only about one inch. Reservoir storage in the San Luis Valley is very much improved over that of last year at this time. There is now in storage, in the principal reservoirs of the valley, 69,300 acre-feet of water as compared with 42,500 a year ago. This is 60 percent more. In the lower Rio Grande the Elephant Butte now has 1,257,400 acre-feet in storage, last year 1,198,700, an increase of 5 percent and in the Caballo reservoir 298,400 and last year 282,000, or more by 6 percent. In the San Luis Valley the soil moisture conditions are fairly good at this time and stream flow somewhat below normal. The snow cover over the valley floor is very light - bare for the most part. In the vicinity of Albuquerque the mountain snow pack is heavy. On Wolf Creek Pass in the San Luis Valley, the snow pack holds less water than last year by about 8 inches. At Summitville it is short by 3 inches and on Cumbres Pass it is more than last year by 2 inches. Snow on the Red River course gained nearly 7 inches since February 1 bringing the total to 13.1 inches, This significant accumulation was due to a heavy fall of snow occurring just prior to survey on this course. This is the largest March 1 water content observed since the snow surveys were begun early in the winter of 1937. The run-off from the Red River drainage this spring will be much above normal.

The general outlook for the coming irrigation season's water supply is quite promising as based on the present snow cover. The February snowfall was not as great as occurred along the mountain range in the central and northern parts of the state. Since the conditions as now exist, measure up to the 10-year average and are on a par with that of last year, it may be expected that the run-off will be reasonably close to normal this coming spring and summer. Because of the usual trend of storms in March and April there is still opportunity for improvement in snow cover before the urgent need of water for irrigation.

CHAMA RIVER: The snow cover on the watershed of this stream is better than it was a year ago. At present the average water content is 10.1 inches in comparison of 8.8 last year, and is practically normal. In the El Vado reservoir there is now in storage 92,900 acre-feet of water as compared with 37,400 last year, which is about 2½ times more. The prospects for runoff from snow in the Chama are fairly good at this time. During the past month the water content of the snow on the headwaters of this stream increased about 2 inches and in the vicinity of the town of Chama the increase was about one inch.

PECOS RIVER: The outlook for the coming season's run-off from snow cover is now reasonably favorable. The water content of the snow averages about ½ inch less than a year ago but is slightly better than the past 10-year mean as based on the reports from the snow courses located within and immediately adjacent, to the headwaters of this stream. In the lower valley, served by the water from the Pecos, the soil moisture is fair and the range and crop conditions are reported as very good. Stream flow is generally below normal for this time of year. Storage in the Carlsbad Project reservoirs now totals 51,000 acre-feet which is about three-quarters of the amount held last year at this time.

CANADIAN RIVER

The present average water content of the snow on the headwaters of the Canadian is less than that of a year ago by about 1 inch, but is more than normal. However, recent storms occurring since the Hematite Park survey on March 3 have no doubt raised the average, and it is probable that conditions more or less approximate that of last year and approach the normal as based on the revised grouping of snow courses within and immediately adjacent to the watershed of this stream. In the area in the vicinity of Tucumcari the soil moisture is good, also the range and crop conditions. The stream flow for this time of year is very low and is largely return seepage from adjacent irrigated lands. The snow cover in this area is slightly below normal. In the Conchas Reservoir there is now 346,900 acre-feet of water in storage. At this time the prospects for an ample water supply for irrigation this season are reasonably good and the run-off from the snow will provide for the irrigation demands during the late spring and early summer months.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS
for
RIO GRANDE BASIN

March 1, 1945

PRECIPITATION DATA

WATERSHED	STATE	Precipitation October 1 to February 28	Departure from Normal	Precipitation February	Departure from Normal
		Inches	Inches	Inches	Inches
Canadian	New Mexico	3.96	+0.66	0.30	-0.19
Rio Grande	Colorado	5.65	+0.58	0.67	-0.59
Rio Grande (N)	New Mexico	5.96	+0.66	0.31	-0.81
Rio Grande (S)	New Mexico	3.57	+0.37	0.09	-0.45
Pecos	New Mexico	3.58	-0.10	0.09	-0.52

Precipitation was considerably below normal over the watersheds of the Canadian and Rio Grande in Colorado and New Mexico during February. The accumulated precipitation from October 1 to February 28 was, however, above normal except over the Pecos watershed where there was a small deficiency.

SUMMARY OF MARCH 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth			Water Content			Number Courses in Average	Snow Density			1945 Water Content in percent of	
	Nine Year Avg.*	1944	1945	Nine Year Avg.*	1944	1945		Nine Year Avg.*	1944	1945	Nine Year Avg.*	1944
	In.	In.	In.	In.	In.	In.		Percent	Percent	Percent		
Rio Grande	31.7	35.5	33.7	8.5	8.8	8.8	23	27	25	26	103	100
Chama River	36.2	37.8	36.8	10.3	8.8	10.1	5	29	23	27	98	115
Pecos River	20.0	24.2	22.8	5.4	6.3	5.8	3	27	26	25	107	92
Canadian River	25.8	31.9	29.1	6.8	8.3	7.5	4	26	26	26	110	90

*Some for shorter periods.

RIO GRANDE WATERSHED
Summary of Federal and State Cooperative Snow Surveys
Issued March 10, 1945, at Fort Collins, Colo.

No.	Main Drainage and Snow Course	Local Drainage	Location: State	Location: Locality	Location: Description	Elev.	National Forest	Mar. 1 Snow Cover Measurements: Av. Snow Depth Av.@	Av. Snow Depth 1944	Av. Snow Depth 1945	Av. Water Content Av.@	Av. Water Content 1944	Av. Water Content 1945
	RIO GRANDE							In.	In.	In.	In.	In.	In.
26	Wolf Creek Pass	South Fork	Colo.	Wolf Cr.Pass	4-37N-2E	10000	Rio Grande	74.9	90.4	65.6	23.0	28.5	20.9
27	Upper Rio Grande	Rio Grande	"	RioGrande Res.	13-40N-4W	9350	" "	24.8	35.3	21.7	5.5	7.6	4.2
47	Silver Lakes	Alamosa R.	"	1mi.S.Silver L.	15-36N-5E	9600	" "	23.2	30.2	25.4	4.7	6.0	5.0
49	River Springs	Conejos R.	"	10mi.W.Mogote	25-33N-6E	9300	" "	27.3	32.1	28.2	6.6	7.6	6.1
74	LaVeta Pass #2	SanCristo Cr.	"	LaVeta Pass	22-28S-70W	9300	SanCristoGr	30.8	27.8	33.7	7.1	6.8	9.0
76	Summitville	Wightman Cr.	"	Summitville	30-37N-4E	11500	Rio Grande	61.1	65.4	58.2	16.3	16.5	13.5
77	Cumbres Pass #2	Los Pinos R.	"	Cumbres Pass	17-32N-5E	10000	" "	68.5	71.6	63.4	21.6	17.9	19.8
80	Santa Maria	N.Clear Cr.	"	Santa Maria Res.	8-41N-2W	9700	" "	19.6	25.9	16.3	4.1	4.7	3.1
82	Culebra	Culebra R.	"	12mi.E.SanLuis	37.2N105.2W	10000	SanCristoGr	36.2	31.4	44.1	9.4	7.3	11.2
84	Fort Garland	Big Ute Cr.	"	6mi.N.Ft.Garland	13-29N-72W	8200	" " "	17.5	15.8	20.9	4.1	2.9	5.3
160 1	Red River	Red River	N.Mex.	6mi.SE.RedRiver	29-28N-15E	9500	Carson	31.5	36.7	45.0	8.9	10.0	13.1
12.4 2	Taos Canyon	Rio de Taos	"	14mi.E.Taos	10-25N-15E	9000	"	22.2	28.1	28.9	6.5	7.5	8.8
7.3 4	Aspen Grove	Rio En Medio	"	10mi.NE.Santo Fe	12-18N-10E	9100	Santa Fe	21.4	23.6	24.2	5.3	6.0	5.2
9.7 5	Lee Ranch	Jemez Cr.	"	5mi.NW.Bland	3-18N-4E	9050	" "	30.1	33.4	30.6	7.5	8.6	7.0
26.5 6	Canjilon	Canjilon Cr.	"	8mi.NE.Canjilon	4-26N-6E	9500	Carson		44.3			15.0	20.0
10.8 9	Hematite Park*	Red River	"	3mi.SE.Red R.	8-28N-15E	9500	"	21.6	30.3	24.6	5.9	8.2	7.4
9.5 12	Tres Ritos	Agua Piedra	"	7mi.W.HolmanHill	23-22N-13E	9000	"	24.6	28.7	26.9	6.4	7.6	6.2
11.2 15	Pay Role	Spring Creek	"	6mi.SE.Hopewell	23-28N-7E	9700	"	35.5	36.4	39.6	8.7	8.1	9.5
16	Jicarilla	Rock Lake Cr.	"	15mi.S.Dulce	9-29N-1W	8500	JicarillaR.	18.4	20.0	26.2	4.4	3.9	~~3.7~~
5.3 17	Chama Divide	Willow Creek	"	6mi.W.Chama	36.9N-106.7W	7750	OffForest	21.4	23.7	19.9	6.2	5.6	6.3
11.7 18	Chamita	Chamita Cr.	"	6mi.NW.Chama	36.9N-106.7W	8500	" "	37.1	37.1	34.8	10.4	8.4	11.1
16.6 19	Cordova	Cordova Canyon	"	2mi.W.Tres Ritos	22-22N-13E	10100	Carson	43.0	43.3	52.7	11.1	11.1	13.1
3.0 20	Panchuela #2*	Panchuela Cr.	"	2mi.N.Cowles	27-19N-12E	8300	Santa Fe	15.6	21.9	16.0	4.1	5.1	4.2
10.2 21	Big Tesuque	Big Tesuque Cr.	"	10mi.NE.Santa Fe	17-18N-11E	10000	" "	23.0	27.1	28.2	6.7	7.7	8.1
					Average for Drainage			31.7	35.5	33.7	8.5	8.8	8.8

*On adjacent drainage
@Average for period of record.

149.9 ✓
11.5

120.0
9.2

RIO GRANDE WATERSHED
Summary of Federal and State Cooperative Snow Surveys
Issued March 10, 1945, at Fort Collins, Colo.

No.	Main Drainage and Snow Course	Local Drainage	Location: State	Location: Locality	Location: Description	Elev.	National Forest	Mar. 1 Snow Cover Measurements: Av. Snow Depth Av.@	Av. Snow Depth 1944	Av. Snow Depth 1945	Av. Water Content Av.@	Av. Water Content 1944	Av. Water Content 1945
								In.	In.	In.	In.	In.	In.
	CHAMA RIVER												
77	Cumbres Pass #2	Los Pinos R.	Colo.	Cumbres Pass	17-32N-5E	10000	Rio Grande	68.5	71.6	63.4	21.6	17.9	19.8
6	Canjilon	Canjilon Cr.	N.Mex.	8mi.NE.Canjilon	4-26N-6E	9500	Carson		44.3			15.0	
15	Pay Role	Spring Creek	"	6mi.SE.Hopewell	23-28N-7E	9700	"	35.5	36.4	39.6	8.7	8.1	9.5
16	Jicarilla	Rock Lake Cr.	"	15mi.S.Dulce	9-29N-1W	8500	Jicarilla R.	18.4	20.0	26.2	4.4	3.9	3.7
17	Chama Divide	Willow Creek	"	6mi.W.Chama	36.9N-106.7W	7750	Off Forest	21.4	23.7	19.9	6.2	5.6	6.3
18	Chamita	Chamita Cr.	"	6mi.NW.Chama	36.9N-106.7W	8500	" "	37.1	37.1	34.8	10.4	8.4	11.1
					Average for Drainage			36.2	37.8	36.8	10.3	8.8	10.1
	PECOS RIVER												
7,3 4	Aspen Grove*	Holy Ghost Cr.	N.Mex.	10mi.NE.Santa Fe	12-18N-10E	9100	Santa Fe	21.4	23.6	24.2	5.3	6.0	5.2
3 620	Panchuela #2	Panchuela Cr.	"	2mi.N.Cowles	27-19N-12E	8300	Santa Fe	15.6	21.9	16.0	4.1	5.1	4.2
10 221	Big Tesuque*	Holy Ghost Cr.	"	10mi.NE.Santa Fe	17-18N-11E	10000	Santa Fe	23.0	27.1	28.2	6.7	7.7	8.1
20 5 6.8					Average for Drainage			20.0	24.2	22.8	5.4	6.3	5.8
	CANADIAN RIVER												
10.8 9	Hematite Park	Moreno Creek	N.Mex.	3mi.SE.Red R.	8-28N-15E	9500	Carson	21.6	30.3	24.6	5.9	8.2	7.4
3.210	Ocate Mesa	Ocate Creek	"	3mi.E.Black L.	25-24N-16E	9200	Off Forest	14.0	25.3	12.2	4.0	6.3	3.3
7.512	Tres Ritos*	Luna Creek	"	7mi.W.Holman Hill	23-22N-13E	9000	Carson	24.6	28.7	26.9	6.4	7.6	6.2
16.619	Cordova*	Luna Creek	"	2mi.W.Tres Ritos	22-22N-13E	10100	"	43.0	43.3	52.7	11.1	11.1	13.1
					Average for Drainage			25.8	31.9	29.1	6.8	8.3	7.5
401 10.0													

*On adjacent drainage
@Average for period of record

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE
- Colorado State Engineer
- Wyoming State Engineer
- Utah State Engineer
- New Mexico State Engineer
- Montana State Engineer
- Nebraska State Engineer
- Colorado Experiment Station
- Colorado Extension Service
- Montana Experiment Station
- Utah Experiment Station

FEDERAL
- Department of Agriculture
  - Forest Service
  - Soil Conservation Service
- Department of Interior
  - Bureau of Reclamation
  - Indian Service
  - Geological Survey
  - National Park Service
- Department of Commerce
  - Weather Bureau
- War Department
  - Army Engineer Corps

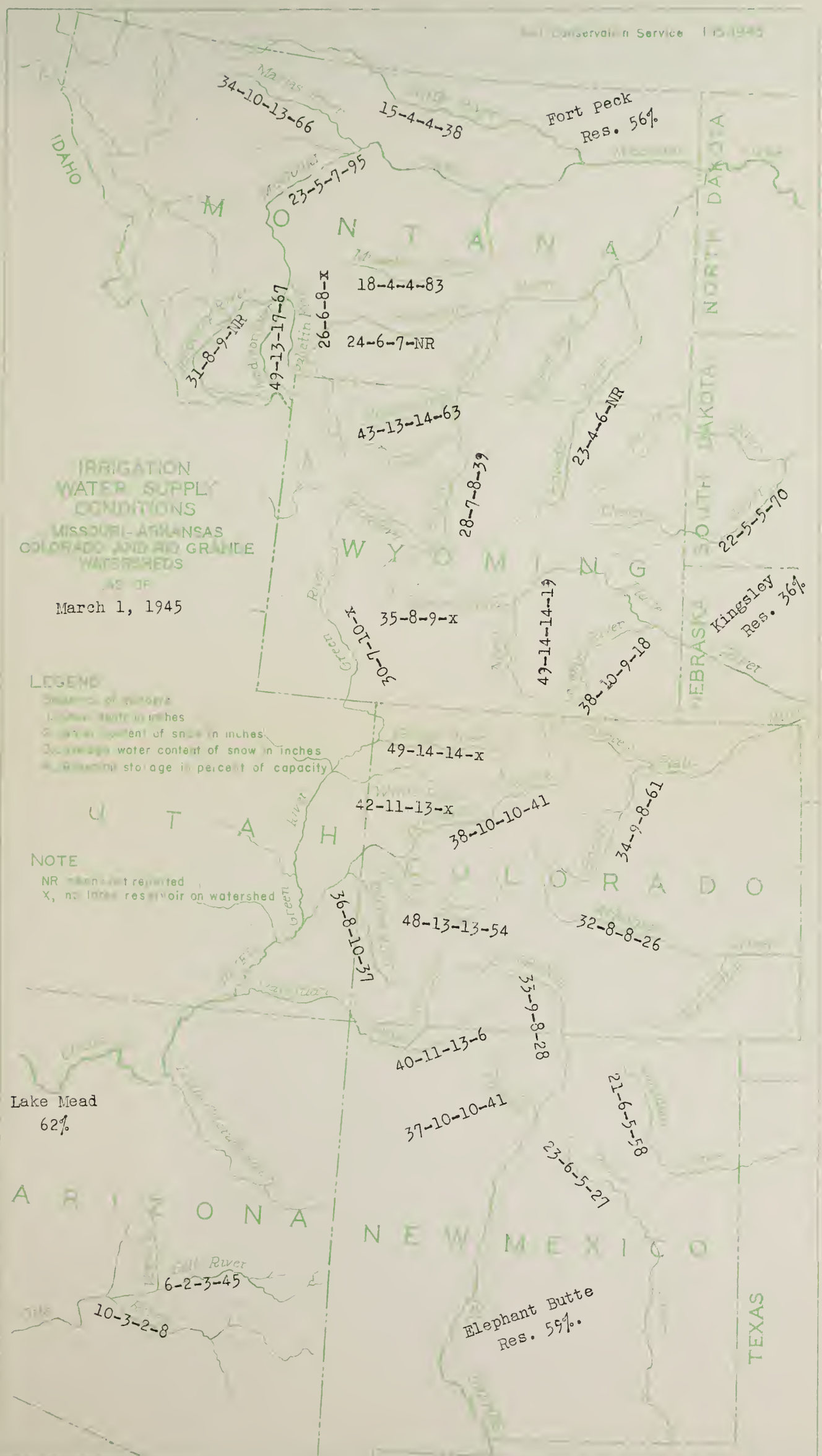
PUBLIC UTILITIES
- Colorado Public Service Company
- Western Colorado Power Company
- Denver and Rio Grande Western R.R. Company

MUNICIPALITIES
- City of Denver
- City of Boulder

WATER USERS ORGANIZATIONS
- Poudre Valley Water Users' Association
- Arkansas Valley Ditch Association
- Colorado River Water Conservation District

IRRIGATION PROJECTS
- Farmers Reservoir and Irrigation Company
- San Luis Valley Irrigation District
- Santa Maria Reservoir Company
- Costilla Land Company
- Uncompahgre Valley Water Users' Association
- Wyoming Development Company
- Goshen Irrigation District
- Kendrick Project
- Pathfinder Irrigation District
- Salt River Valley Water Users' Association
- San Carlos Irrigation and Drainage District

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.


Soil Conservation Service
IRRIGATION
WATER SUPPLY
CONDITIONS
MISSOURI-ARKANSAS
COLORADO AND RIO GRANDE
WATERSHEDS
AS OF
March 1, 1945
LEGEND
NOTE
NR
X, no
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
TEXAS
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
34-10-13-66
15-4-4-38
Fort Peck
Res. 56%
23-5-7-95
18-4-4-83
26-6-8-x
49-13-17-67
31-8-9-NR
24-6-7-NR
43-13-14-63
23-4-6-NR
28-7-8-39
22-5-5-70
Kingsley
Res. 36%
35-8-9-x
30-7-10-x
49-14-14-19
38-10-9-18
49-14-14-x
42-11-13-x
38-10-10-41
34-9-8-61
36-8-10-37
48-13-13-54
32-8-8-26
35-9-8-28
40-11-13-6
21-6-5-58
37-10-10-41
23-6-5-27
Lake Mead
62%
6-2-3-45
10-3-2-8
Elephant Butte
Res. 59%